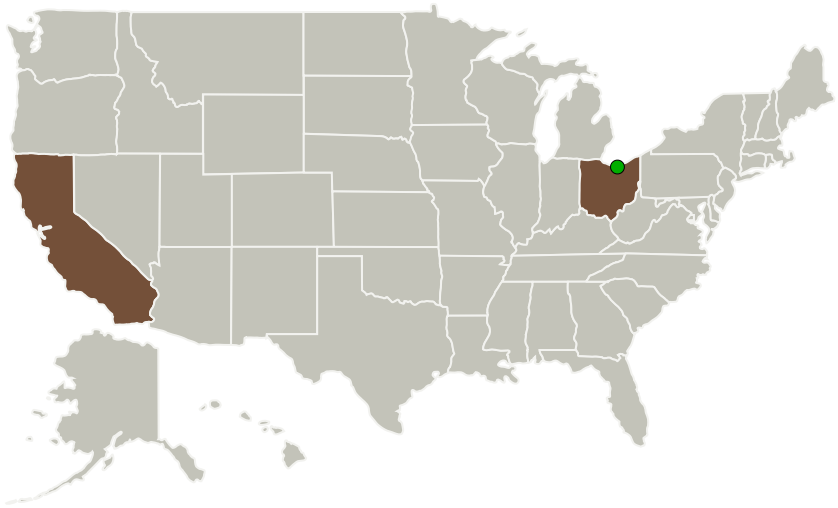
An LED-Based Solar Simulator for Research, Development, and Testing of Photovoltaic Space Power Systems, Phase I

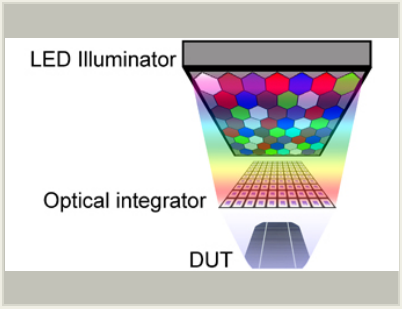
Completed Technology Project (2013 - 2014)

Project Introduction

Solar cells are the critical power source for the majority of space missions. The advancement from single junction silicon cells to current, state-of-the-art, triple junction, germanium cells enabled greater mission power per weight, stowed volume and deployed area. Near-term, advanced solar cell technologies will range from 4 to 6 junctions, and include a variety of band gaps. Solar cell testing is critical to space missions. Every solar cell is tested at the cell level under continuous light and at the panel, wing and sometimes spacecraft level multiple times under LAPSS. Current test methods calibrate the light source by measuring the current output of each junction and adjusting the source accordingly. Today's sources are a combination of lamps and filters. As cells with more the 3 junctions come into test, more flexible sources of narrower bands will be needed and current methods will have extreme difficulty, complexity and expense trying to keep up with the variety of near-term advanced solar cell designs. We propose a solid state illumination source with enough discrete source wavelengths to be flexible enough to be calibrated to any number of junctions, up to 6, for continuous cell testing. In addition, this source would be cost effective enough to allow many sources connected together to perform large area testing, pulsed or continuous, for panel and wing level testing. Calibration would follow similar methods to the current practice, but would be simplified through a software interface.

Primary U.S. Work Locations and Key Partners





AN LED-BASED SOLAR SIMULATOR FOR RESEARCH, DEVELOPMENT, AND TESTING OF PHOTOVOLTAIC SPACE POWER SYSTEMS

Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

An LED-Based Solar Simulator for Research, Development, and Testing of Photovoltaic Space Power Systems, Phase I

Completed Technology Project (2013 - 2014)

Organizations Performing Work	Role	Type	Location
Angstrom Designs, Inc.	Lead Organization	Industry	Santa Barbara, California
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio
University of California-Santa Barbara(UCSB)	Supporting Organization	Academia	Santa Barbara, California

Primary U.S. Work Locations	
California	Ohio

Project Transitions

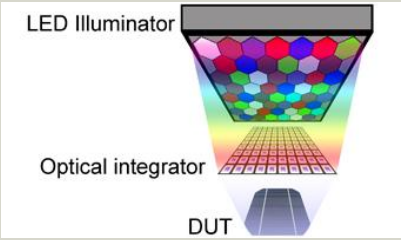
May 2013: Project Start

May 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140720)*

Images



Project Image
AN LED-BASED SOLAR SIMULATOR FOR RESEARCH, DEVELOPMENT, AND TESTING OF PHOTOVOLTAIC SPACE POWER SYSTEMS
(https://techport.nasa.gov/image/135121)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Angstrom Designs, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

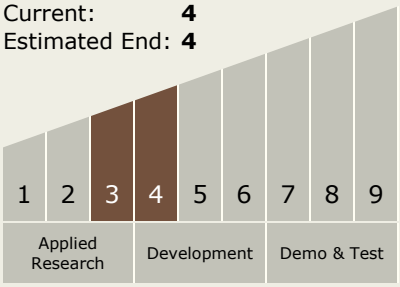
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Casey P Hare

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



An LED-Based Solar Simulator for Research, Development, and Testing of Photovoltaic Space Power Systems, Phase I

Completed Technology Project (2013 - 2014)

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.1 Power Generation and Energy Conversion
    - TX03.1.1 Photovoltaic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System